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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,491	09/23/2003	Robert Sheffield	57983.000131	1242
21967 7590 06/24/2008 HUNTON & WILLIAMS LLP INTELLECTUAL PROPERTY DEPARTMENT 1900 K STREET, N.W. SUITE 1200 WASHINGTON, DC 20006-1109				
EXAMINER				
VAN, LUAN V				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/667,491

Applicant(s)

SHEFFIELD ET AL.

Examiner

LUAN V. VAN

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-6, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-6, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

The instant application has been reopened for further examination after the Decision by the Board of Patent Appeals and Interferences decided on February 6, 2008 based on the substantial evidence of record for providing a case of prima facie obviousness. This has been approved by the examiner's supervisor and the Director's designee. Applicant's amendment of May 21, 2008 has been entered.

Status of Objections and Rejections

All rejections from the previous office action are withdrawn.

New rejections under 35 U.S.C. 103(a) are necessitated by the amendments.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 4-6, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Tanaka et al. (US patent 4959507).

Regarding claim 1, Tanaka et al. teach a method for forming a bonded ceramic-metal composite substrate, the method comprising the step of: providing a layer of the circuit board 1 having the conductive circuit trace 2 (figure 1) on a surface thereof; and reducing a surface roughness (column 2 lines 23-35) of at least one surface of the conductive circuit trace on the surface of the circuit board layer. The method of Tanaka et al. would inherently improve the performance of a signal transmitted via the conductive circuit trace, since the surface roughness of the copper element 2 is reduced. Furthermore, Tanaka et al. teach that the median surface roughness of the copper circuit sheet be not greater than 1 μm , or equivalent to about 254 microinches, and a maximum surface roughness be not greater than 8 μm , or equivalent to about 387 microinches (column 3 lines 9-12).

Tanaka et al. differ from the instant claim in that the reference does not explicitly teach the narrower range of roughness of the instant claim.

However, the range of roughness of Tanaka et al. (a surface roughness of no more than 254 microinches) encompasses the range of roughness of the instant claim (a surface roughness of no more than 20 microinches). Therefore, this encompassing range of roughness of Tanaka et al. is *prima facie* obviousness over the range of the instant claim. According to MPEP 2144.05, "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d

1379, 1382-83 (Fed. Cir. 2003). >See also *In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005).

Regarding claim 2, Tanaka et al. teach wherein the step of reducing the surface roughness includes mechanical polishing the at least one surface (column 4 lines 59-64).

Regarding claims 4-5, the ground of rejection of the instant claims parallel that given above in claim 1.

Regarding claim 6, Tanaka et al. teach wherein the at least one surface of the conductive circuit trace includes one of a group consisting of: a surface parallel and distal to a surface of the circuit board; a surface parallel and proximal to the surface of the circuit board; and a surface perpendicular to the surface of the circuit board (figure 1).

Regarding claim 19, Tanaka et al. teach wherein the conductive circuit trace is formed on the surface of the circuit board layer 1 (figure 1).

Regarding claim 20, Tanaka et al. teach wherein the conductive circuit trace 2 is bonded (i.e., affixed, column 3 lines 56-60) to the surface of the circuit board layer 1.

Claims 1, 2, 4-6, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (US patent 4959507) in view of Nagai et al. (US pub 2002/0155021).

Regarding claim 1, Tanaka et al. teach a method for forming a bonded ceramic-metal composite substrate, the method comprising the step of: providing a layer of the

circuit board 1 having the conductive circuit trace 2 (figure 1) on a surface thereof; and reducing a surface roughness (column 2 lines 23-35) of at least one surface of the conductive circuit trace on the surface of the circuit board layer. The method of Tanaka et al. would improve performance of a signal transmitted via the conductive circuit trace, since the surface roughness of the copper element 2 is reduced. Furthermore, Tanaka et al. teach that the median surface roughness of the copper circuit sheet be not greater than $1\text{ }\mu\text{m}$, or equivalent to about 254 microinches, and a maximum surface roughness be not greater than $8\text{ }\mu\text{m}$, or equivalent to about 387 microinches (column 3 lines 9-12).

Tanaka et al. differ from the instant claim in that the reference does not explicitly teach the narrower roughness range of the instant claim.

Nagai et al. teach "Large surface roughness of a copper foil results in the skin effect such that the current of electric signal having 1 GHz or more of frequency locally flows only on the surface of a coil. As a result, the impedance increases and the transmission of high-frequency signals is seriously influenced. Fine surface roughness is, therefore, necessary for conductive material used in a high-frequency circuit. The present inventors examined the relationship between the surface roughness and the high-frequency performance and discovered that 2 micrometer or less of surface roughness [or equivalent to about 97 microinches] in terms of the terms of the ten-point average surface-roughness (Rz) attains the desired high-frequency performance. The fine roughness can be provided by means of producing a wrought copper foil or electro-deposited copper foil under appropriate conditions, or chemically or electrolytically polishing the surface of a copper foil" (paragraph 28).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a smaller surface roughness in the copper sheet of Tanaka et al., because a smaller surface roughness would improve the high-frequency performance of the device by reducing the impedance, as taught by Nagai et al. (paragraph 28).

Regarding claim 2, Tanaka et al. teach wherein the step of reducing the surface roughness includes mechanical polishing the at least one surface (column 4 lines 59-64).

Regarding claims 4-5, the ground of rejection of the instant claims parallel that given above in claim 1.

Regarding claim 6, Tanaka et al. teach wherein the at least one surface of the conductive circuit trace includes one of a group consisting of: a surface parallel and distal to a surface of the circuit board; a surface parallel and proximal to the surface of the circuit board; and a surface perpendicular to the surface of the circuit board (figure 1).

Regarding claim 19, Tanaka et al. teach wherein the conductive circuit trace is formed on the surface of the circuit board layer 1 (figure 1).

Regarding claim 20, Tanaka et al. teach wherein the conductive circuit trace 2 is bonded (i.e., affixed, column 3 lines 56-60) to the surface of the circuit board layer 1.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LVV
June 19, 2008

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795

/Gregory L Mills/

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